AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
J	1 | 5

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO.(If applicable)
0001	29-Sep-2005	W81D4A-5208-6769	

6. ISSUED BY	CODE	7. ADMINISTERED BY (If other than item 6)	CODE
CONTRACTING DIVISION 69-A HAGOOD AVE CHARLESTON SC 29403-5107	W912HP	**See Item 6**	

8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		
	X	9A. AMENDMENT OF SOLICITATION NO. W912HP-05-B-0005
	X	9B. DATED (SEE ITEM 11) 08-Sep-2005
		10A. MOD. OF CONTRACT/ORDER NO.
		10B. DATED (SEE ITEM 13)
CODE / FACILITY CODE		

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

[X] The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer [ ] is extended, [X] is not extended.

Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

[ ] A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

[ ] B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).

[ ] C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

[ ] D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor [ ] is not, [ ] is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this amendment is to do the following:

a. Change the bid opening time from 2:00 p.m. to 11:00 a.m local time. The bid opening date HAS NOT changed.
b. Add clause 52.228-5 - Insurance.
c. Add the changes to the specifications listed below (See SF 30 Continuation Sheet) and clarify the requirement for use of Dredge Data Logging System (DDLS) explained in Attachement O and Hopper Dredge Silent Inspector explained in Attachement P.
d. Answer Contractor questions. See below (SF 30 Continuation Sheet).

As a result of the changes to the specifications, the Bid Schedule has changed. Contractor is requested to use the revised Bid Schedule to submit bids.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
	TEL: EMAIL:

15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		BY (Signature of Contracting Officer)	30-Sep-2005

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

The following have been added by full text:
A0001 SPECIFICATION CHANGES
Any enclosures accompanying this amendment should be inserted in the plans and/or specifications as applicable. All superseded materials should be removed or adequately marked to indicate that they have been superseded.

SPECIFICATION

1. SECTION 00010, SOLICITATION CONTRACT FORM, ITEM NO. 0003 AND ITEM NO. 0009, Replace "Dredge Data Logging System" with Dredge Monitoring and Data Collection System".

2. SECTION 01130, Delete paragraph 3.8.3.1 and Replace with the following paragraph:

3.8.3.1 Dredging Window for Hopper Dredges

The Biological Opinion and Incidental Take Statement has restricted hopper dredging activities to be accomplished between 1 November and 31 May. However, due to the large number of turtles encountered from 1 November to 15 December and from 1 April to 31 May, the performance period for hopper dredges in Charleston Harbor for this contract shall be 15 December to 31 March. The performance period for Georgetown Harbor shall be 1 December to 31 March.

3. SECTION 02325, Delete paragraph 1.1.4 and Replace with the following paragraph:

1.1.4 Work Required by Bid Items 0003 and 0009

The work required by Bid Items 0003 and 0009 shall include the Dredge Monitoring and Data Collection System and preparation of the Disposal Area Report required by these specifications.

4. SECTION 02325, Delete paragraph 3.1.2 and Replace with the following paragraph:

3.1.2 Dredge Monitoring and Data Collection System

The dredge excavation plant used on this project is required to operate with instrumentation so that position and performance parameters of dredging vessels can be monitored. The Dredge Data Logging System (DDLS) will be required on each and any type of dredge/excavating equipment/plant (i.e. cutterhead, bucket, dipper, scow or disposal barge, and separate booster pump or pumpout facility) with the exception of the hopper dredge. The Silent Inspector System (SIS) will be required for hopper dredges. The dredge monitoring and data collection systems (DDLS and/or the SIS) shall meet the requirements detailed in the ATTACHMENTS for either describing the requirements, calibration, performance, data storage, delivery, and inspection requirements for the dredging operations monitoring system. The DDLS and/or the SIS shall be acquired, installed, calibrated, operated, and maintained by the Contractor.

5. SECTION 02325, Delete paragraph 3.9.2.2 and Replace with the following paragraph:

3.9.2.2 Georgetown Entrance Channel

The Contractor shall dispose of all dredged material in the Government-furnished open dredged material disposal site (ODMDS) as shown on the contract drawings. The dredged material shall be dumped within 50 feet either side of the dump lines shown on the drawings, beginning at Line 23-24, until the bottom elevation of the dump site has been altered such that no area along these lines is above elevation -25 feet MLW (mean low water). When the area along Line 23-24 is no longer able to receive disposal material, Line 21-22, immediately to the south, shall be used until the fill along it reaches an elevation of -25 feet

MLW, then the next line to the south shall be used, etc. No material shall be placed above elevation -25 feet MLW in the disposal area.

ATTACHMENTS

1. ATTACHMENT O, Delete Attachment O in its entirety and replace with the revised Attachment O.

2. ATTACHMENT P, Insert Attachment P after Attachment O.

ANSWERS - CONTRACTOR QUESTIONS

QUESTION: Will there be additional surveys conducted due to the possible impacts of Hurricane Ophelia?

ANSWER: The most dynamic areas in the coastal zone are the beaches and the nearshore zone. Eroding sand will remain primarily in those areas; thus, we would expect negligible effects in the entrance channels, particularly in the near term. The advertised quantities already include additional volumes due to anticipated shoaling between the time the 30-day condition survey was made and the start of dredging.

QUESTION: Which Period of Performance is correct? In Section 52.211-4004, it states
A Performance Period of:
Charleston 15-December-05 to 31-March-06
Georgetown 01-December-05 to 31-March-06

But in Section 01130 3.8.3.1, Dredging Window for Hopper Dredges it states "The performance period for Hopper dredges for this contract shall be 15-December -05 to 31-March-06."

ANSWER: See revised Specification changes.

QUESTION: The description in the specs for the disposal of material from the Georgetown Entrance Channel, Section 3.9.2.2, does not match the dumpline numbers on the drawing. It looks like it should start with dumpline 23-24 and move South to dumpline 21-22 when the previous line is full. The description in the specs specifies to start dumping with line 25-26 and move South to dumpline 27-28 when the previous line is full.

ANSWER: See revised Specification changes.

SECTION 00010 - SOLICITATION CONTRACT FORM

CLIN 0003

The CLIN description has changed from Dredge Data Logging System to Dredge Monitoring & Data Collection Sys.

The CLIN extended description has changed from Dredge Data Logging System and Disposal Area Report for Charleston Entrance Channel to Dredge Monitoring and Data Collection System and Disposal Area Report for Charleston Entrance Channel.

CLIN 0009

The CLIN description has changed from Dredge Data Logging System to Dredge Monitoring & Data Coll Sys.

The CLIN extended description has changed from Dredge Data Logging System and Disposal Area Report for Georgetown Entrance Channel to Dredge Monitoring and Data Collection System and Disposal Area Report for Georgetown Entrance Channel.

SECTION 00700 - CONTRACT CLAUSES

The following have been added by reference:

52.228-5	Insurance - Work On A Government Installation	JAN 1997

(End of Summary of Changes)

Section 00010 - Solicitation Contract Form

CAUTION TO BIDDERS
Bidders are cautioned not to add extraneous notes or conditions to their bids. Such notes or conditions will disqualify a bid from consideration. The price schedule must be completed as written.

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001		1	Lump Sum		

Mobilization and Demobilization
FFP
Charleston Entrance Channel
PURCHASE REQUEST NUMBER: W81D4A-5208-6769

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002		1,515,000	Cubic Yard		

Dredging of Unclassified Material
FFP
Charleston Entrance Channel

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0003		1	Lump Sum		

Dredge Monitoring & Data Collection Sys
FFP
Dredge Monitoring and Data Collection System and Disposal Area Report for Charleston Entrance Channel

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0004		1	Lump Sum		

Compliance w/ Endangered Species Act
FFP
and Marine Mammals Protection Act
Charleston Entrance Channel

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0005		3	Each		

Abundance Trawling
FFP
24 Hours,
Charleston Entrance Channel

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0006		10	Each		
	Relocation Trawling FFP 12 Hour Days, Charleston Entrance Channel				

NET AMT

FOB: Destination

SUBTOTAL LINE ITEMS 0001 THROUGH 0006 $_____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0007		1	Lump Sum		
	Mobilization and Demobilization FFP Georgetown Entrance Channel				

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0008		579,000	Cubic Yard		
	Dredging of Unclassified Material FFP Georgetown Entrance Channel				

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0009		1	Lump Sum		

Dredge Monitoring & Data Coll Sys
FFP
Dredge Monitoring and Data Collection System and Disposal Area Report for Georgetown Entrance Channel

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0010		1	Lump Sum		

Compliance w/ Endangered Species Act
FFP
and Marine Mammals Protection Act
Georgetown Entrance Channel

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0011		3	Each		

Abundance Trawling
FFP
24 Hours,
Georgetown Entrance Channel

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0012		10	Each		
	Relocation Trawling FFP 12 Hour Days, Georgetown Entrance Channel				

NET AMT

FOB: Destination

SUBTOTAL LINE ITEMS 0007 THROUGH 0012 $_____

GRAND TOTAL LINE ITEMS 0001 THROUGH 0012 $ _____

Dredge Data Logging System
(Disregard any references to hopper dredges)

1. INTRODUCTION

1.1 **Purpose**. The dredge excavation plant used on this Project is required to operate with instrumentation so that position and performance parameters of the dredging vessels can be monitored at specified intervals. This document describes the hardware, calibration, performance, data storage, delivery, and inspection requirements for the dredging monitoring system. Section 1 gives a brief introduction of the DDLS. Section 2 describes the sensor, sensor output and data collection. Section 3 describes the specific format and parameters to be measured and collected for each type of dredging equipment that shall be fitted and equipped to comply with this document.

1.2 **Definitions**. The dredging monitoring system described above will be termed the Dredging Data Logging System (DDLS). The DDLS shall be acquired, installed, calibrated, operated, and maintained by the Contractor. DDLS performance varies according to the type of dredging equipment used. Types of dredging equipment are described in detail in Engineer Manual 1110-2-5025 "Dredging and Dredged Material Disposal."

1.3 **Minimum Plant Instrumentation.** The vessels required to be configured with instrumentation meeting the requirements for the DDLS shall include the following types of equipment / plant: This attachment applies to all dredging/excavating equipment that could be used on a dredging contract with the exception of hopper dredges. Hopper dredges shall use the Silent Inspector System. All equipment identified in this attachment may not apply to the anticipated equipment used in this contract.

A. Each and any type of dredge / excavating equipment. Cutterhead, bucket, dipper, etc.
B. Each scow or disposal barge used to transport dredged material to or from a designated disposal location.
C. Each separate pumping / booster station or pumpout facility not covered as part of the equipment in 1.3 A above.

2. SENSOR AND SENSOR OUTPUT REQUIREMENTS

2.1 **General**. The DDLS sensor requirements are compatible with standard dredging industry monitoring equipment and signal outputs. Sensor output signal strengths and quality at the DDLS storage and logging unit(s) shall be in accordance with manufacturer's specifications. The Contractor is responsible to provide data to the Contracting Officer's Representative, COR using industry standard sensors.

2.1.1 **Instrumentation Plan** The contractor shall develop an Instrumentation Plan that shows how he will gather data, perform quality control on the data, calibrate and repair sensors/data reporting equipment when they fail, and distribute the sensor data and computed dredge specific data to the COR. The contractor shall keep a log of sensor problems and repairs. Re-calibration may be directed at any time during contract execution as deemed necessary. No re-calibration or adjustments to the calibration controls shall be performed without notification to the COR. Physical documentation of

the calibration procedures and corresponding printed verification data shall be provided for every calibration and repair event.

The Instrumentation Plan shall be submitted prior to commencement of dredging operations by the contractor at the preconstruction conference. Prior to dredging operations or within 48 hours after dredging operations have begun, the COR or a designated representative of the contracting officer shall physically inspect each instrumented dredging plant to verify the Instrumentation Plan; this may include verification of each sensor, sensor location and position, sensor signal conditioning and routing, data acquisition equipment performance and location, power supplies and charging system, calibration equipment, documentation, computations and equations, plant dimensions, etc.

The contractor shall be allowed up to 72 hours after dredging has commenced to have a fully operational DDLS system in accordance with this attachment - DDLS or the contractor shall be subject to Par. **Sensor and Collection Performance Requirements** and possible suspension of dredging operations until the DDLS system becomes and remains fully operational in accordance with this attachment.

2.1.2 **DDLS Data ASCII File Format**. The data shall be capable of being read and manipulated with software running on an operating system of MS-DOS 3.3 or newer version. The files shall include all applicable sensor values in the units described in this section (as applicable to the type of dredging equipment used, in ASCII, comma delimited, floating point data. Signs and decimal points are indicated as stated for specific parameters measured. The required record fields as applicable to the type of dredging equipment used described in Section 3 shall be separated with a comma (ASCII 32, 20 Hex) and terminated with a carriage return, line feed (CR/LF) sequence (OD/OA Hex). Examples of maximum record lengths are shown in Section 3 as they apply to the type of dredging equipment used. The length of each data field shall not exceed the number of characters described for each DDLS sensor in Section 2 and these fields shall contain only those characters described (in engineering units) for each particular DDLS sensor described in Section 2. No additional characters or data shall be included with specified DDLS data file fields and records on the DDLS data files without COR approval.

2.1.3 **Required Data and Filenames**. The Contractor shall store data in one separately identified data file per instrumented vessel or piece of equipment on removable storage media. Data shall be transmitted as required in Par. **Data Inspection and Collection** and become Government property. Once recorded by the data logger the data shall not be edited or modified by the contractor unless given approval to make changes by the COR. Data files shall not be returned to the Contractor. Data files shall include data for daily operations for each vessel beginning at 0000 hours and concluding at 2400 hours or an agreed upon increment with the COR for each individual DDLS, except as noted in Par. **Time and Julian Date** to account for daylight savings time adjustments. Data filenames will be created as jjjyyccc.bbb where jjj will be replaced with the Julian day; yy will be replaced with current year e.g. 02 for 2002; ccc will represent the contract number such that DACW60-02-C-0009 will be shown 209 with the 3 digits representing the last digit of the year and last 2 digits in the contract number; bbb will be replaced with a 3-character abbreviation for the vessel that the DDLS operates on. Each 3 character vessel abbreviation shall be approved for data filenames by the COR. Brief DDLS data collection interruptions for file storage and next-day setup procedure completion are necessary and expected. Excessive downtime shall be treated as described in Par. **Sensor and Collection Performance Requirements**.

2.1.4 **Data Inspection and Collection**

2.1.4.1 **Viewable Data** All required data shall be viewable in real time on a monitor located on each vessel so that the recorded data can be compared against the actual physical properties being measured. For example, if 15 different measurements are required on a vessel all those parameters must be viewable as they are recorded. Once the cycle is updated the refreshed readings should then be viewable and so on. The screen must be easily read during bright sunlight or low lighting conditions and shall be kept clean of moisture and other impediments restricting clear viewing of data.

2.1.4.2 **Daily Data Storage** Each vessel's daily data shall be provided to the COR on removable storage media. The contractor shall make available daily vessel data to the COR on 3-1/2" (1.44Mbyte) diskettes or other removable storage format approved by the COR no later than 24 hours after the data has been recorded. Collection of the recorded data media shall be arranged with the COR at agreed upon intervals.

2.1.5 **Power and Storage Requirements**. Continuous, filtered system power sources, sufficient to maintain 24 hour supply to the computer/logger and analog/digital sensors shall be provided. The computer data logger shall be capable of storage/data collection for a minimum 30 day period at 1 minute or more frequent intervals depending upon vessel requirements data collection interval, 24 hours per day, 7 days per week. The on-board logger shall be able to log the specified parameters for each vessel.

2.1.6 **DDLS Sample, Logging, and Storage Interval**. Each DDLS must operate with the capability to adjust sample, logging, and storage interval settings. The DDLS must be capable of sampling sensor outputs, logging, and storing those outputs at 1 second or more frequent intervals. The DDLS may also be required to operate at the minimum 1 second or otherwise specified sample rate and average values over a longer interval (i.e., 1 minute, 5 minutes, etc.) for logging and storage. An initial sample, logging and storage time interval (with or without data averaging) will be based on the approved instrumentation plan. As data are reviewed by the COR during and throughout the dredging operations, the Contractor shall be responsible to adjust DDLS sample, logging, and storage intervals as prescribed by the COR. Initial anticipated logging data recording intervals shall be 1 minute / 60 seconds for all the required parameters on each vessel except as noted in the paragraphs below requiring more frequent recording intervals for Scow Barges and Mechanical Dredges.

2.1.6.1 **Additional Requirements for Hopper Dredges and Scow Barges**
Initial logging data recording intervals shall be 1 minute / 60 seconds for all the required parameters on each vessel except bottom dumping vessels transporting material for open water disposal, i.e. scow barges. These vessels shall also record position and draft every 6 seconds while near and within the designated open water disposal area. A longer period, 1 minute / 60 seconds of recording frequency is required for the scow barge when traveling to and from the disposal area or while loading.
Scow barges will be required to record all parameters every six seconds when the vessel begins its approach approximately 1000 feet outside the designated disposal area bounded by the perimeter line enclosing the designated dump lines/lanes as shown on the contract drawings, into the area and during dumping and continuing the six second recording intervals until the dump vessel is then approximately 1000 feet outside of the perimeter of the designated disposal area enclosing the dump lines/lanes.

2.1.6.2 **Additional Requirements for Mechanical Dredges, Bucket, Dipper, Clamshell, Backhoe, etc.**
Initial data logging recording intervals shall be 1 minute / 60 seconds for all the required parameters on each vessel except mechanical type dredges during excavation operations. These vessels shall also record the required parameters for this type vessel every 6 seconds when dredging operations are in process. A longer period, 1 minute / 60 seconds of recording frequency is required for the mechanical dredge when idle.

2.1.7 **Sensor and Collection Performance Requirements**. The Contractor shall be responsible for replacement of system components and sensors to provide DDLS data (within 24 hours if failure occurs) of the DDLS for the duration of dredging, transport and pumpout operations. Any compromise of DDLS system operation or DDLS component failure beyond this 24 hour time period during dredging operations may result in suspended dredging operations at the discretion of the Contracting Officer until the DDLS system operates with all specified data properly recorded. Manufacturer's descriptions of sensors, sensor operation, and sensor calibration procedures and calibration intervals shall be provided to the COR prior to dredging operations for each vessel meeting the requirements for instrumentation and monitoring.

2.1.7.1 **Data not Recorded** It shall be presumed if no recording of data is made the vessel is not operational. If any part of the required data string is missing for any recording interval the performance of the DDLS is subject to Par. **Sensor and Collection Performance Requirements.**

2.1.7.8 **Resolution of Missing Data Report** Missing data from interval strings or complete missing data intervals shall be reconciled immediately. Justification for the failure or lack of data shall be forwarded to the COR on a regular basis. A weekly or more frequent summary report as determined by the COR shall be forwarded to the COR explaining any recording failures and the resolution of the missing data for each vessel requiring instrumentation according to this attachment. An instrumented vessel not operating shall also be reported in the report. Exact times and reasons for each interval or partial interval recording failure shall be reconciled in this report.

2.1.8 **System of Measurement** The English system (foot-pounds) will be utilized for this contract however, if directed by the COR the contractor shall convert all future data to a metric system of measurement with units specified at the time of conversion. The contractor shall be allowed 14 days to convert all sensor and recording equipment after written notification.

2.1.9 **Year 2000 Compliant** All hardware and software used with the DDLS shall be certified Y2K compliant. Downtime or erroneous data because of the year 2000 problem will be considered a component failure and shall be subject to the Par **Sensor and Collection Performance Requirements.**

2.2 **Recorded Parameters**

2.2.1 **Header File Field Labels** At the beginning of each day's data recording the following data shall be listed one time: If not applicable state NA.

Current Date: Month-Day-Year
Contract Number: DACW60-
Vessel Name: Name Of Vessel
Vessel Captain: Captain's Full Name
Volume of Scow Barge : Rating Volume Cubic Yards
Distance of Scow From Tow Vessel: Stern of Tow Vessel to Bow of Barge
Disposal Technique: Bottom Dump, Pumpout, etc.
Draft Empty: Feet rounded up at .5 Ft
Datum: SC State Plane NAD83, Etc.
Phase 1: Save Data Every 60 Seconds
Phase II: Save Every Data Every 06 Seconds
Phase III: Save Data Every __ Seconds

A field ID heading is required beginning in the first column and progressing across to include all required columns for each type of vessel recorded. A sample of column labels for a would be as follows:

Time,Jul,x83,y83,Lat83,Lon83,Head,Foredr,Aftdr,Pdepth,PRPM,Ppres,Pvac,Sdepth,SRPM, Spres,Svac

Approval of the COR is required before header data and field ID heading are finalized for recording.

2.2.2 **Time and Julian Date**. The contractor shall calibrate time daily from any national or internationally recognized time source such as Greenwich mean time. Local time shall be recorded in the DDLS to the nearest second in military-style 24-hour format Eastern Standard time. Adjustments shall be made to account for daylight savings time, meaning that DDLS data will cover a 25 hour time period for one day and 23 hour time period for one day of operations per year. The time and julian date data field will occupy 12 characters in an hour-minute-second and julian date form so that a typical DDLS time entry representing 1 minute and 30 seconds past 4 o'clock PM on Jan 31, 2002 would appear as: Year not recorded electronically here.

Time (local hour-minute-second) Julian Date (calendar day of the year)
Julian dates shall be recorded in the DDLS to the calendar day as jjj from 1 to 365/366.

16 01 30,031

2.2.3 **Horizontal Positioning**. Horizontal positioning for all instrumented vessels shall be recorded in the DDLS in Eastings and Northings and Latitude and Longitude using differential global positioning system equipment operating with a minimum accuracy level of 10 feet or better horizontal. The coordinates shall be corrected to display and record the physical centerline location of each vessel measured at the intersection point longitudinally and transversely projected along the vessel unless otherwise specified. Cutterhead or bucket positions shall be recorded instead of the vessel centerline. Easting and Northing Positioning ,1983 NAD Geographic Coordinates, shall be recorded with a typical positioning value in the DDLS output string that would occupy a seven and six character field with zero decimal places and Latitude and Longitude Positioning, NAD 83 shall be

recorded with a typical positioning value in the DDLS output string that would occupy two nine character fields carried to six decimal places and appears as:

Eastings, Northings, (0 decimal places) Latitude, Longitude (degrees, 6 decimal places)

2389000,312220,32.362878,79.364565

Coast Guard DGPS

Information and reference/description of the U.S. Coast Guard Differential Global Positioning System can be obtained from the U. S Coast Guard or their internet website.

2.2.4 **Compass Heading**. Compass Heading shall be recorded by the Contractor into the DDLS using industry standard equipment described in written form and approved by the COR prior to dredging. Compass headings shall be recorded for position in positive degrees only from 0 to 360 degrees and to the nearest whole degree. The Contractor shall input data into the DDLS with 0 degrees equal to true north and with a sign convention so that positive degrees are in a clockwise direction. Headings shall be measured longitudinally in a direction from the aft portion of the vessel toward the excavating devices or direction of travel for scow vessels. Pumping stations do not require compass heading measurements. Compass headings shall occupy a data field 3 characters long so that a typical heading of 89.5 would be rounded up to next whole number at or above .5 degrees due east would be:

Compass Heading (degrees**)**
090

2.2.5 **Draft**. Barges (scows) used to transport dredged material shall input draft measurements into the DDLS in feet to the nearest foot. Industry standard bubbler systems or equivalent system may be used by the Contractor. Fore and aft draft readings are required for each vessel. Calibration of draft measurements are required to assure accurate readings and shall be included in the instrumentation plan. Draft data will occupy two data fields with 2 characters each rounded up to the next whole number at a fractional value of .5 or higher reading so that the DDLS entry would appear as:

Draft (fore and aft, respectively, in feet)
15,14

2.2.6 **Depth of Cut**. Cutterhead dredges and and bucket dredges shall input depth of excavation measurements into the DDLS in feet to the nearest .1 foot. Industry standard bubbler systems or equivalent system may be used by the Contractor. Readings are required for each excavation device's lowest cutting or dredging depth capability. Calibration of depth measurements are required to assure accurate readings and shall be included in the instrumentation plan. Depth of Cut data will occupy 1 data field 4 characters long. The DDLS entry would appear as:

Depth of Cut Below Datum (feet)
45.1

2.2.7 **Pump Drive RPM.** As required based on the type of dredging equipment used by the Contractor i.e. cutterhead main and ladder pumps, hopper dredging and pumpout, pump stations, etc. where pumping systems are used to pump excavated slurry or pump out from a scow or hopper barge. Each pump drive RPM shall be recorded by a measuring device or calculated from prime mover RPM approved for use by the COR and calibrated according to manufacturer's specifications prior to commencement of work. A typical Pump Drive RPM value in the DDLS output string would occupy three character field and appear as:

Pump Shaft RPM (revolutions per minute)
150

2.2.8 **Pump Discharge Pressure and Vacuum.** As required based on the type of dredging equipment used by the Contractor ie. cutterhead main and ladder pumps, and pumpout main pumps, pump stations, etc. where pumping systems are used to pump excavated slurry or pump out from a scow. Each discharge pressure and vacuum measurement shall be recorded by a measuring device approved for use by the COR and calibrated according to manufacturer's specifications prior to commencement of work. The discharge pressure device shall be located as close to the discharge flange and vacuum device shall be located as close to the eye of the pump as practicable attached to the suction piping. A pressure or vacuum value output string would occupy two data fields two characters long rounded up to next whole number at a fractional value of .5 or higher reading and appear as:

Pump Discharge Pressure (pounds per square inch),Pump Vacuum (inches of mercury)
10,05

2.2.9 **Dump Identification Number.and Vacuum.** The contractor shall record each dump at the ODMDS using a sequential identification numbers, which will occupy 5 characters, starting with number 1.

Dump ID
00001

3.0 **DDLS Input Variations by Dredging Equipment Type.**

3.1 **General.** Data file format and organization by sensor outputs are specified according to the type of equipment put in service by the Contractor. This section describes the required data and sensor requirements for bucket dredges, cutterhead dredges, barge (scows) and pumping / booster and pumpout stations. The **Time and Julian Date** data field shall occupy column 1 in the data record followed by the remainder of the specified **Time and Julian Date** field characters and sequentially by other data fields as specified in this section for each type of dredging equipment.

3.2 Mechanical /Bucket, Clamshell, Etc. Dredge Requirements

3.2.1 **Bucket Dredge Dimensions**. Additional information provided for each bucket dredge will include a schematic of the dredge showing:

a. Scaled vessel dimensions including hull and decks.

b. Boom dimensions

c. Bucket dimensions.

This information will be used to transfer DGPS position to the bucket and must be certified accurate by a licensed marine architect.

3.2.2 **Bucket Dredge Parameters** The bucket type dredge shall include the following parameters separated by commas:

Time and Julian Date, Bucket Horizontal Positioning, Bucket Depth, Dump ID

16 01 30,031,2389000,312220,32.366728,79.367845,46.0

3.3 Scow Barge Requirements

3.3.1 **Scow Dimensions**. Additional information provided for each scow will include a schematic of the dredge showing scaled vessel dimensions.

3.3.2 **Barge Ullage Chart and Dimensions**. The contractor will supply the COR with the barge ullage table which lists the bin volume as a function of depth, and the barge draft displacement table, listing the barge displacement as a function draft. These tables must be certified by a licensed marine surveyor or architect. Curves of form that provide this information may also be used subject to approval by the COR. All curves of form shall also be certified by a licensed marine surveyor or architect. The ullage and draft information must provide information (AB,C,D and E constants) fitting the following polynomial equations for volume and weight:

$$\text{Volume} = A + BX + CX^2 + DX^3 + EX^4$$

Where X is Bin level in Feet measured positive upward from the bin bottom and Volume is in Cubic Yards

$$\text{Weight} = A + BX + CX^2 + DX^3 + EX^4$$

Where X is Draft in Feet

And Weight is in pounds

The contractor will also provide the COR with dimensioned drawings of the barge bin. These drawings shall include the bin length, depth, and width. A bin cross section should be included with dimensions. The overall barge dimensions will also be provided, showing the location of the fore and aft bubbler ports (or equivalent draft measurement system). A copy of the users manual for the sensors will be provided to the COP, along with a detailed description of the data acquisition system that is being used. All dimensions are to be certified by a licensed marine surveyor or architect.

3.3.3 **Barge Water Tests Requirements**. Once the barge DDLS is installed and calibrated, the COR will direct the contractor in performing 2 water tests. Each water test will consist of 1) pumping the bin out to its lowest level and then 2) filling the bin to capacity with water. At each of the stages of the test (empty and full state), a time duration of at least 2 minutes will pass before going to the next stage. Data will be logged in the DDLS and reviewed and stored by the COR. After the two water tests, the COR will evaluate the DDLS for accuracy. If the COR's review of the data indicates an unsatisfactory calibration, a re-calibration of the acoustic sensors and review of contractor-supplied draft and load information may be necessary and retesting be performed. During dredging operations, up to 2 water tests will be conducted per week at the time and discretion of the COR. The COR will review the water tests data to insure that the system is operating-within acceptable accuracy, directing the contractor to re-calibrate or repair the DDLS input components as necessary.

3.3.4 **Scow Parameters** The scow barge shall include the following parameters separated by commas:

Time and Julian Date,Vessel Horizontal Positioning,Draft Fore,Aft,Dump ID

3.3.5 **DDLS Sample Data for Scow Barges.** Typical data line for each recording interval shall be written to file in the format as shown below:

16 01 30,031, 2389000,312220,38.962845,79.873645,15,15,00001

3.4 Cutterhead Dredge Requirements

3.4.1 **Cutterhead Dredge Dimensions**. Additional information provided for each cutterhead dredge will include a schematic of the dredge showing:

a. Scaled vessel dimensions including hull and decks.

b. Suction ladder length(s) in straight segments with any angled sections shown labeled in degrees.

c. Cutter basket dimensions.

This information will be used to transfer DGPS position to the cutterhead. Also to be provided with the cutterhead dredge dimensions is the inside discharge pipe diameter along the locations of the slurry velocity and slurry density metering devices. Cutterhead Dredge dimensions are to be certified by a licensed marine architect.

3.4.2 **Cutterhead Dredge DGPS Antenna Location**. The DGPS antenna shall be located directly over the pivot point of the suction ladder. The elevation from the centerline of the suction ladder pivot point to the DGPS antenna shall also be measured to the nearest 0.1 foot and provided to the COR.

3.4.3 **Cutterhead Parameters** The cutterhead type dredge shall include the following parameters separated by commas:

Time,Julian Date,Cutterhead Horizontal Positioning E,N,Lat,Long,Cutterhead Depth, Main Pump Drive RPM,Ladder Pump Drive RPM, Main Pump Discharge Pressure,Main Pump Vacuum

3.4.4 **DDLS Sample Data for Cutterhead Dredges.** Typical data line for each recording interval shall be written to file in the format as shown below:

16 01 30,031,2389000,312220,32.624568,79.365645,45.1,140,150,12,05

3.5 Other Excavating ,Pumping or Transporting Equipment

Should the contractor use equipment or plant not identified in the sections 3.1 through 3.4 a similar data record shall be required to include the appropriate parameters listed in section 2.

HOPPER DREDGE SILENT INSPECTOR

PART 1 GENERAL

1.0 INTRODUCTION

The Silent Inspector (SI) for Hopper Dredges is a system that can monitor dredge position, dredge state, compute dry tonnage, and report and manage the data for Corps of Engineers dredging contracts. This specification defines the data collection needs of the Contracting Officer for managing the present and proposed future contracts whereby the Government will measure and compensate the contractor based on performance. Most of the required data parameters are currently available through existing sensors on industry hopper dredges. The collection and recording of the data in standard format will afford timely analysis of these data for dredge performance indicators. On unit priced contracts, SI will be used to verify parameters and assist in evaluating claims.

Additionally, the data will assist the CONTRACTING OFFICER or his/her representative with contract administration and lessen government manpower allocations for continuous inspection, and meet ever increasing environmental monitoring requirements established by the responsible agencies. The SI system collects and records measurements from shipboard sensors, calculates the dredging activities and the weight of the recovered material, and displays this information with standard reports and graphical displays. Recorded data are also automatically backed up, and later archived to allow transfer of the data to other locations.

The system consists of sensors connected to two primary components: a dredge-specific system component (DSS), and a ship-based component Dredge Monitoring Computer (DMC) (CONTRACTING OFFICER or his/her representative’s computer). The DSS (Dredge Specific System) collects sensor data, checks these data against acceptable ranges, computes the status of the dredging pumps (on/off) and other equipment and sends the data via serial link to the Ship Server.

The DMC attaches the dredge name and contract/permit number to the DSS provided data, and inserts data into the system's central database. The DMC maintains the system's central database, accepting data in near-real time from a DSS. The DMC then reviews those data, computes the present dredging activity being performed and the amount of material recovered, and produces reports (trip, daily) and graphical displays of the data. Additional information concerning the dredging project, the dredges used, and location of the dredging and disposal areas are also inserted into the system database.

1.2 PAYMENT

The system shall be operational at the start of dredging. The Contractor shall include all costs for this system within the Lump Sum price for “Dredge Monitoring and Data Collection System”.

1.3 DREDGE PLANT INSTRUMENTATION PLAN

The Contractor shall develop a Dredge Plant Instrumentation Plan (DPIP) that shows how the contractor will gather sensor data, perform quality control on those data, calibrate and repair sensors/data reporting equipment when they fail, and distribute the sensor data and computed dredge specific data to the CONTRACTING OFFICER or his/her representative's computer via a standard interface. The Contractor shall keep a log of sensor problems and repairs. Re-calibration may be directed by the Contracting Officer or his/her representative at any time during contract execution as deemed necessary. No recalibration or adjustments to the calibration controls shall be performed in the absence of the CONTRACTING OFFICER or his/her representative. Physical documentation of the calibration procedures and corresponding printed verification data shall be provided for every calibration event.

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 SENSOR SPECIFICATIONS

The contractor shall provide, operate and maintain all hardware and software to meet the following specifications.

3.1.1 Slurry densities of port and starboard dragarms

The slurry density of each dragarm shall be recorded by a density-metering device approved for use by the CONTRACTING OFFICER or his/her representative and calibrated according to the manufacturer's specifications prior to commencement of work and documented in the DPIP.

3.1.2 Slurry velocities of port and starboard dragarms

The slurry velocities of each dragarm should be obtained by a flow-metering device approved for use by the CONTRACTING OFFICER or his/her representative and calibrated according to the manufacturer's specifications prior to commencement of work and documented in the DPIP. A magnetic flow-metering device calibrated according to manufacturer's specifications prior to commencement of work is the preferred flow-metering device. The slurry velocity shall be obtained using the same pipeline inside diameter as the slurry density measurement.

3.1.3 Draghead depths

The depth of each draghead (relative to the water surface) shall be obtained with a minimum accuracy of $\pm$ 1/2 foot with values recorded to the nearest 1/10 foot. Conventional bubbler or other dragarm measuring systems may be used to provide both draghead depths, but their operation and accuracy must be described in detail in written form and included in the DPIP for approval prior to dredging. Draghead depth data shall be relative to the water surface level without tidal elevation adjustments.

3.1.4 Horizontal Positioning

Horizontal dredging equipment positioning shall be provided in Lambert State Plane coordinates based on North American Datum 1983. Horizontal positioning shall be obtained using differential Global Positioning System (DGPS) equipment operating with a minimum accuracy level of 1-3 meters horizontal Circular Error Probable (CEP). Differential Correction broadcasts will be furnished 24 hours/day by the Government in standard RTCM SC-104 ver 2.0 output. Horizontal positioning shall be recorded to the nearest whole foot when provided in State Plane coordinates.

3.1.5 Vessel Heading and Course

Vessel headings shall be provided using industry standard equipment described in written form and approved by the CONTRACTING OFFICER or his/her representative prior to dredging. Calibration shall be performed according to manufacturer's specifications prior to commencement of work and documented in the DPIP. The contractor shall provide dredge compass heading with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention. Furthermore, the contractor shall provide dredge course over ground with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention.

3.1.6 Draft

Fore and Aft draft measurements shall be reported to the nearest 1/100-foot from the hopper dredge's keel. Industry standard bubbler systems or equivalent system approved by the CONTRACTING OFFICER or his/her representative prior to dredging may be used by the contractor. The contractor must provide, as part of the DPIP documentation, how to relate measured fore and aft draft values to external draft markings on the hopper dredge. The contractor shall verify draft sensor calibration according to manufacturer's specifications prior to commencement of work and document the calibration in the DPIP.

3.1.7 Hopper level

Fore and aft hopper material level measurements shall be obtained with a minimum accuracy of $\pm$ 1/10 foot with values recorded to the nearest 1/100-foot. To minimize the influence of vessel trim and list, four hopper level measurement sensors are recommended, two (port and starboard) fore and two (port and starboard) aft sensors. A minimum of two sensors are required, one fore and one aft. If only two sensors are used, they should be mounted in a location as close as possible over the hopper centerline and away from discharge flume turbulence and foam. If more than one fore or one aft sensor is used, then they should be placed near the corners of the hopper and the average value of the fore sensors and the average value of the aft sensors shall be reported. The contractor shall maintain a functional spare sensor on-board the dredge. The contractor shall install and calibrate the sensors according to manufacturer's directions and guidelines.

As part of the DPIP submittal, the contractor shall provide calibration information for all sensors. The plan shall include four measurements of different hopper levels, comparing the sensor value to a standard, i.e., a tape measure. The CONTRACTING OFFICER or his/her representative may perform checks of the reported sensor to hopper level distance. Distance from sensor face to: 1) bottom of hopper and, 2) reference elevation for ullage measurements to calculate volume of hopper contents, shall be measured and provided to the CONTRACTING OFFICER or his/her representative as a part of the DPIP.

3.1.8 Tide

Tide data shall be obtained using appropriate equipment to give the water level accurate to the nearest 1/10 foot. Government furnished benchmark location and water level datum information will be provided at the dredging site and given to the contractor. Above datum (positive) tide values shall be entered with a positive sign, and below datum tide values shall be entered with a negative sign.

3.1.9 Hopper status

Open/closed measurements of hopper status shall be obtained. These data correspond to the split/not-split condition for a split hull hopper dredge. A hopper dredge with hopper doors may measure the status of a single door that is the first opened during normal disposal operations. An OPEN value refers to when the hopper door is open or in the case of split hull dredges, the hull is split. A CLOSED value refers to when the hopper doors are closed or in the case of split hull dredges, the hull is not split. The format is shown in paragraphs 3.4.2 and 3.4.3.

3.1.10 Material recovery

True/False reports of material recovery shall be obtained. A True value refers to when the dredge is actually digging material. The contractor shall submit as part of the DPIP the project and dredge specific criteria used to determine this state for approval by the CONTRACTING OFFICER or his/her representative. An example criterion is shown in section 3.4.3.

3.1.11 Date and time

The date and time shall be reported to the nearest second in the format shown in sections 3.4.2 and 3.4.3. The time shall be referenced to UTC time. The reported time is the time the measurements were taken.

3.1.12 Pumpout

Open/closed measurements of dredge pumpout valve status shall be obtained. This measurement shall be True when the dredge is pumping out and False when it is not. The format is shown in sections 3.4.2 and 3.4.3.

3.1.13 Pumping water

True/False reports of pumping water shall be obtained. A True value refers to when the dredge is not digging material but pumping water (or very low-density material) through the dredge pump(s). The contractor shall submit as part of the DPIP the project and dredge specific criteria used to determine this state for approval by the CONTRACTING OFFICER or his/her representative. An example is shown in section 3.4.3.

3.1.14 Minimum pumping effort

True/False reports of minimum pumping effort shall be obtained. A True value refers to when the dredge's pumps are running at idle speed or are off. The contractor shall submit

as part of the DPIP the project and dredge specific criteria used to determine this state for approval by the CONTRACTING OFFICER or his/her representative. An example is shown in section 3.4.3.

3.2 PERFORMANCE REQUIREMENTS

3.2.1 Sensors

The Contractor shall be responsible for replacement or repair of system components and sensors to provide SI data (within 24 hours if failure occurs) of the SI System for the duration of dredging, transport and dump operations. Any compromise of the SI System operation or SI System failure beyond this 24 hour time period during dredging operations may result in suspended dredging operations at the discretion of the Contracting Officer until the SI System operates with all specified data properly recorded.

3.2.2 System

To meet the overall goals stated in the introduction, the contractor's DSS system shall provide a minimum 95 percent data return. Data return is defined as the total number of valid data strings sent by the DSS system to the CONTRACTING OFFICER or his/her representative's computer divided by the number of data strings that are possible to send during a given time interval. The possible number of data strings for a given time interval is defined by the data-reporting interval in paragraph 3.4. Acceptable system performance includes the system consistently reporting correct data, especially at major transitions in the dredging cycle. Pay may be reduced at the discretion of the CONTRACTING OFFICER or his/her representative for failure to meet these system performance requirements.

3.3 CONTRACTOR PROVIDED EQUIPMENT

3.3.1 Data Monitoring Computer

The contractor shall supply the CONTRACTING OFFICER or his/her representative a computer that will run Corp's software and receive data from the contractor's data reporting interface. The DMC should contain at minimum a Pentium IV (or equivalent) microprocessor with no less than a 1.2 Gigahertz CPU. The computer must contain a hard disk no smaller than 8 Gigabytes, include at least 256 Megabytes of system memory, support the PCI system bus and support the Windows 2000 operating system. The contractor shall be responsible for obtaining component vendor software drivers if the drivers are not provided with the latest release of the Windows 2000 operating system software. The computer must also contain an Ethernet adapter that supports 10BaseT Unshielded Twisted Pair connections that shall connect to the network hub (contractor shall supply a stranded Category 5 UTP patch cable to the network hub and two spares). Also, it should have a standard 101 key keyboard, Microsoft compatible mouse, at minimum one parallel, two unoccupied serial ports, a universal serial bus port, and a CD-ROM drive (16X speed or faster). It should also have a minimum of 17-inch (viewable-size measured diagonally) video monitor capable of supporting at a minimum XVGA resolution of 1024x768 pixels, 65536 viewable colors. Also the system should include a 100Mb Zip disk mounted either internally or externally. The contractor shall make available all computer related owner's guides and instruction manuals.

If a CONTRACTING OFFICER or his/her representative's hardware (including printer and other hardware) fails to operate properly, the CONTRACTING OFFICER or his/her representative is responsible to determine the nature of the problem. If a hardware problem is identified, then the contractor shall be responsible for repairing it within 48 hours.

3.3.2 Network Hub

The CONTRACTING OFFICER or his/her representative's computer shall communicate via IEEE 802.3 Ethernet and the TCP/IP networking protocol. The contractor shall provide to the CONTRACTING OFFICER or his/her representative a network hub to allow the temporary addition of the CONTRACTING OFFICER or his/her representative's portable computers to the computer network. The hub should provide a minimum of four RJ-45 ports that support Category 5 Unshielded Twisted-Pair Network wiring.

3.3.3 UPS

The contractor shall also supply an Uninterruptible Power Supply (UPS) for the computer and networking equipment. The UPS should provide backup power at 1kVA for a minimum of 10 minutes. The UPS should have a serial interface to the CONTRACTING OFFICER or his/her representative's computer to communicate UPS status. The contractor shall ensure that sufficient power outlets are available to run all specified equipment.

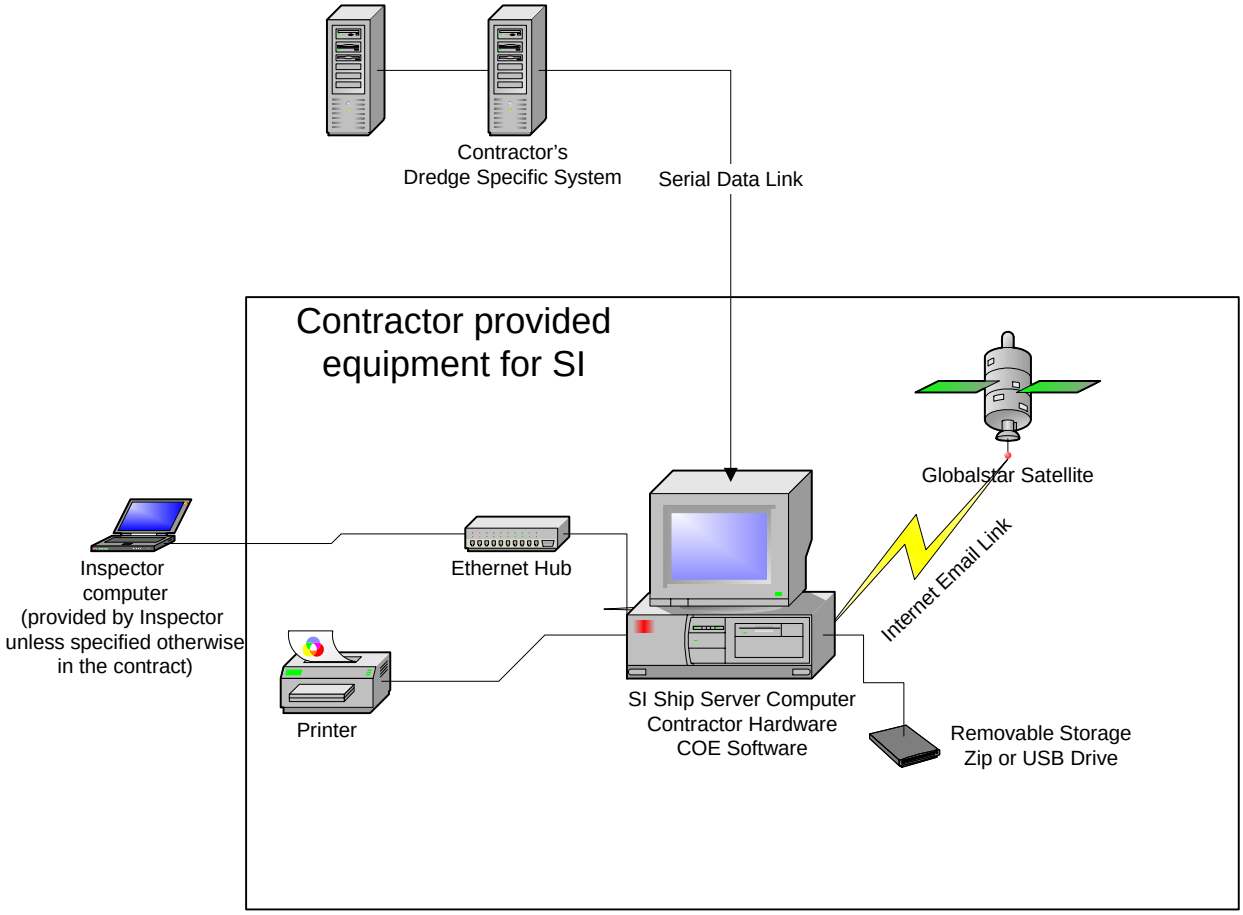
3.3.4 Printer

The contractor shall supply a printer. The printer will connect to the specified Ship computer via a parallel interface (cable supplied by the contractor). The printer should support the Adobe Postscript Level 2-page description language. Also, the printer should have a minimum resolution of 300 dots per inch and have a rated print speed of 6 pages per minute or higher. Additionally, the printer should have minimum paper capacity of 100 pages of 8.5X11 inch paper. The contractor is responsible for maintaining a supply of printer paper and other consumables such as printer cartridges. Printer usage will not exceed 500 pages per month.

3.3.5 Satellite Data Modem

The contractor shall provide a satellite phone or modem, establish service and install the relevant equipment for use as a data link. The satellite data transmission device shall be equal to or equivalent to a SeaTel Wavecall 3000 or Qualcomm GSP-1620 which have the following salient characteristics: connection to externally mounted antenna, db-9 connector serial data transmission port, compatible with the Globlalstar satellite system, 9.6Kbaud data transmission rate, no internet service provider required to access the Internet, and compatible with Microsoft windows dialup networking. The data transmission time required is 1 to 3 minutes for each hopper load.
To avoid data interference, the satellite data modem is for the excusive use of the DMC computer during the length of the contract. The contractor shall provide copies of all relevant operating and reference manuals for the satellite data phone/modem. As in 3.3.1 if the modem fails then the contractor shall repair it within 48 hours.

3.3.6 Figure of Contractor provided equipment



3.4 DATA REPORTING INTERFACE

Standard data shall be sent to the CONTRACTING OFFICER or his/her representative's computer. The sensor data should be output via an RS-232 19200-baud serial interface to the CONTRACTING OFFICER or his/her representative's data-monitoring computer. The serial interface shall be configured as 8 bits no parity and no flow control.

3.4.1 Data Measurement Interval

Data are reported as a series of events. Disposal activities are required to be logged with high temporal and spatial resolution. A standard data string should be nominally sent every 10 seconds. The failure to send a data string within 25 seconds to the CONTRACTING OFFICER or his/her representative's computer results in a dredge down status determination by the automated monitoring system if the dredge is within two miles of the disposal or dredging area. Data strings should never be sent more frequently than one per second. The standard events are in the following table:

Event Description	Event Time Resolution
An elapsed time of 10 seconds since the last event	1 second
Start of Disposal Activity	1 second
End of Disposal Activity	1 second

3.4.2 XML Reporting Data Format

The data are reported as an eXtensible Markup Language (W3C standard XML 1.0) document. The format required here facilitates viewing the data in a web browser as well as automated handling of the data. Data tags that are marked optional may be omitted or reported according the XML convention of <TAG_NAME/> to signify an empty tag. Line Breaks and spaces are added for readability here, but the carriage return, line feed character combination is only added to delineate records (HOPPER_DREDGING_DATA tag) for actual data transmission.

<?xml version="1.0"?>
<HOPPER_DREDGING_DATA version = “2.0”>
<DREDGE_NAME> **string32** </DREDGE_NAME>
<HOPPER_DATA_RECORD>
<DATE_TIME> **time date string** </DATE_TIME>
<LOAD_NUMBER> **integer string** </LOAD_NUMBER>
<VESSEL_X coord_type = “(SP,LL,UTM)”> **floating point string** </VESSEL_X>
<VESSEL_Y coord_type = “(SP,LL,UTM)”> **floating point string** </VESSEL_Y>
<DRAFT_FORE> **floating point string** </DRAFT_FORE>
<DRAFT_AFT> **floating point string** </DRAFT_AFT>
<VESSEL_SPEED> **floating point string** </VESSEL_SPEED>
<VESSEL_HEADING> **floating point string** </VESSEL_HEADING>
<VESSEL_COURSE> **floating point string** </VESSEL_COURSE >
<DRAGHEAD_DEPTH_PORT> **floating point string** </DRAGHEAD_DEPTH_PORT>
<DRAGHEAD_DEPTH_STBD> **floating point string** </DRAGHEAD_DEPTH_STBD>
<ULLAGE_FORE> **floating point string** </ULLAGE_FORE>
<ULLAGE_AFT> **floating point string** </ULLAGE_AFT>
<HOPPER_VOLUME> **floating point string** </HOPPER_VOLUME>
<DISPLACEMENT> **floating point string** </DISPLACEMENT>
(Optional) <EMPTY_DISPLACEMENT> **floating point string** </EMPTY_DISPLACEMENT>
<TIDE> **floating point string** </TIDE>
<HULL_STATUS> **OPEN/CLOSED string** </HULL_STATUS>
<PUMP_WATER_PORT> **true/false/unknown string** </PUMP_WATER_PORT>
<PUMP_WATER_STBD> **true/false/unknown string** </PUMP_WATER_STBD>

<PUMP_MATERIAL_PORT> **true/false/unknown string**</PUMP_MATERIAL_PORT>
<PUMP_MATERIAL_STBD> **true/false/unknown string** </PUMP_MATERIAL_STBD>
<PUMP_OUT_ON> **true/false/unknown string** </PUMP_OUT_ON>
<MIN_PUMP_EFFORT_PORT> **true/false/unknown string** </MIN_PUMP_EFFORT_PORT>
<MIN_PUMP_EFFORT_STBD> **true/false/unknown string** </MIN_PUMP_EFFORT_STBD>
<PORT_VELOCITY> **floating point string** </PORT_VELOCITY>
<PORT_DENSITY> **floating point string** </PORT_DENSITY>
<STBD_VELOCITY> **floating point string** </STBD_VELOCITY>
<STBD_DENSITY> **floating point string** </STBD_DENSITY>

The following tags are optional unless otherwise stated in section 3.4.3.

<PORT_DRAG_X coord_type = "(SP,LL,UTM)"> **floating point string**</PORT_DRAG_X>
<PORT_DRAG_Y coord_type = "(SP,LL,UTM)"> **floating point string**</PORT_DRAG_Y>
<STBD_DRAG_X coord_type = "(SP,LL,UTM)"> **floating point string**</STBD_DRAG_X>
<STBD_DRAG_Y coord_type = "(SP,LL,UTM)"> **floating point string**</STBD_DRAG_Y>
<WATER_DEPTH> **floating point string** </WATER_DEPTH>
<PUMP_RPM_PORT> **floating point string** </PUMP_RPM_PORT>
<PUMP_RPM_STBD> **floating point string** </PUMP_RPM_STBD>
<STBD_GIMBAL_DEPTH> **floating point string** </STBD_GIMBAL_DEPTH>
<PORT_GIMBAL_DEPTH> **floating point string** </PORT_GIMBAL_DEPTH>

The end of optional tags

</HOPPER_DATA_RECORD>
</HOPPER_DREDGING_DATA>
Carriage return – ASCII value 13
Line Feed – ASCII value 10

3.4.3 Reporting Data Metadata

Data Tag	Tag Notes
LOAD_NUMBER	The number of the load the dredge is currently working on. Normally, the load number is incremented at the completion of the disposal phase of each loading cycle. Loads are determined according to the convention specified by the CONTRACTING OFFICER or his/her representative.

Data Tag	Tag Notes
X_POSITION	Dredge X position. Latitude or Easting in state plane coordinates. West Longitude values are reported as negative and Northerly Latitude reported as positive. Latitude and Longitude values are to be reported to the hundredth of a minute. State plane coordinates may be reported to the nearest whole foot and are the preferred means of position reporting. The attribute **coord_type** has the value SP for state plane coordinates, LL for Latitude or Longitude and UTM for Universal Transverse Mercator coordinates. Only these three values are valid.
Y_POSITION	Dredge Y position. Longitude or Northing in state plane coordinates. The same comments for the X_POSITION tag apply.
STBD_DRAG_X PORT_DRAG_X	Draghead X position as computed or measured by the contractor. The same comments for the X_POSITION tag apply. The coord type attribute should have the same value for this tag as for the X_POSITION and Y_POSITION tags.
PORT_DRAG_Y STBD_DRAG_Y	Draghead Y position. The coord type attribute should have the same value for this tag as for the X_POSITION and Y_POSITION tags. The same comments for the X_POSITION tag apply.
DATE_TIME	mm/dd/yyyy hh:mm:ss defined as UTC time of the measurement. All of the measurements should have occurred within one second of this reported time.
DRAGHEAD_DEPTH_PORT DRAGHEAD_DEPTH_STBD	Depth below water surface of the low fixed point of each draghead. This value includes a correction for the draft and trim of the vessel, and is not depth below the keel.
HULL_STATUS	OPEN or CLOSED are the only permissible values. If the hull is split, then the value is OPEN. If the hull is closed, then the value is CLOSED. Status of the hopper doors as either open (OPEN), all doors fully closed (CLOSED). Any single hopper door open requires a door open status.
MIN_PUMP_EFFORT_PORT MIN_PUMP_EFFORT_STBD	True when the hopper dredge's dredge pumps are either idling to assure minimum dragarm intake velocity or off. Pump revolutions per minute below a certain idle threshold or dragarm slurry velocity at or below the idle speed threshold could be used depending on the particular dredge plant and project. The criteria may be tailored for each dredge and project. Reported as true or false.
PUMP_MATERIAL_PORT PUMP_MATERIAL_STBD	True when the hopper dredge is digging material. For example when the slurry velocity is greater than 10 feet per second and the density is greater than 1.05 grams per cubic centimeter, then material recovery is true. These criteria may be tailored for each dredge and project. This value is applied to each dragarm. Reported as true or

Data Tag	Tag Notes
	false.
PUMP_WATER_PORT PUMP_WATER_STBD	True when the hopper dredge is not recovering material but only pumping water. For example when the slurry density is less than 1.05 grams per cubic centimeter, then the dredge is pumping water. This criterion may be tailored for each dredge and project. Other parameters such as pump vacuum (for example) could be used to satisfy the pumping water requirement. Reported as true or false.
PUMP_OUT_ON	Status of pumpout activity. When pumpout is active the value is true, when pumpout is not active the value is false.
VESSEL_SPEED	The vessel speed measured in knots at the reported time.
VESSEL_HEADING	The dredge heading reported from 0 to 359 degrees
VESSEL_COURSE	The dredge course over ground reported from 0 to 359 degrees
DRAFT_FORE DRAFT_AFT	Draft of vessel in feet at the forward and aft sensor locations
DISPLACEMENT	Weight of the dredge at the time of measurement in long tons.
PUMP_RPM_PORT PUMP_RPM_STBD	The shaft revolutions per minute of the pumps that are used to pump excavated slurry. Dredges that have multiple pumps per side should select the pump that best describes the dredging process and document this in the DPIP (typically the outboard pumps). Pump RPM that are used to compute the PUMP_WATER, PUMP_MATERIAL and MIN_PUMP_EFFORT tags should be included here. This parameter (is/is not) required for this contract.
EMPTY_DISPLACEMENT	Weight of the dredge with a completely empty hopper in long tons for the current load. This parameter (is/is not) required for this contract.
ULLAGE_FORE ULLAGE_AFT	Distance from the top of the bin down to the surface of the dredged material in the bin (measured in feet). This distance is called ullage and the corresponding capacity tables are known as hopper ullage tables. These values are obtained either by averaging multiple sensors (i.e., from port and starboard corners of the fore bin for one value and, from port and starboard corners of the aft bin for another) or optimal placement of a single fore and single aft sensor.
PORT_SLURRY_DENSITY STBD_SLURRY_DENSITY	Instantaneous dragarm slurry density (grams/cubic centimeters)
PORT_SLURRY_VELOCITY STBD_SLURRY_VELOCITY	Instantaneous dragarm slurry velocity (feet/second)
WATER DEPTH	Depth below the keel at the location of the sensor. This parameter (is/is not) required for this contract.
PORT_GIMBAL_DEPTH STBD_GIMBAL_DEPTH	Depth below water surface of the dragarm gimbals. This parameter (is/is not) required for this contract.
HOPPER_VOLUME	Volume of the bin in cubic yards computed from the ullage sensor values.

3.4.4 Data Reporting Example

```
<?xml version="1.0"?>
<HOPPER_DREDGING_DATA version = “2.0”>
  <DREDGE_NAME>Essayons</DREDGE_NAME>
    <HOPPER_DATA_RECORD>
          <DATE_TIME>04/11/2002 13:12:05</DATE_TIME>
          <LOAD_NUMBER>102</LOAD_NUMBER>
          <VESSEL_X coord_type =  "LL">10.123345</VESSEL_X>
          <VESSEL_Y coord_type =  "LL">-80.123333</VESSEL_Y>
          <DRAFT_FORE>10.05</DRAFT_FORE>
          <DRAFT_AFT>15.13</DRAFT_AFT>
          <VESSEL_SPEED>3.4</VESSEL_SPEED>
          <VESSEL_HEADING>302</VESSEL_HEADING>
          <VESSEL_COURSE>258</VESSEL_COURSE>
          <DRAGHEAD_DEPTH_PORT>55.10</DRAGHEAD_DEPTH_PORT>
          <DRAGHEAD_DEPTH_STBD>53.21</DRAGHEAD_DEPTH_STBD>
          <ULLAGE_FORE>10.11</ULLAGE_FORE>
          <ULLAGE_AFT>10.22</ULLAGE_AFT>
          <HOPPER_VOLUME>2555.2</HOPPER_VOLUME>
          <DISPLACEMENT>4444.1</DISPLACEMENT>
          <EMPTY_DISPLACEMENT>2345.0</EMPTY_DISPLACEMENT>
          <TIDE>-0.1</TIDE>
          <HULL_STATUS>CLOSED</HULL_STATUS>
          <PUMP_WATER_PORT>true</PUMP_WATER_PORT>
          <PUMP_WATER_STBD>true</PUMP_WATER_STBD>
          <PUMP_MATERIAL_PORT>false</PUMP_MATERIAL_PORT>
          <PUMP_MATERIAL_STBD>false</PUMP_MATERIAL_STBD>
          <PUMP_OUT_ON>false</PUMP_OUT_ON>
          <MIN_PUMP_EFFORT_PORT>false</MIN_PUMP_EFFORT_PORT>
          <MIN_PUMP_EFFORT_STBD>false</MIN_PUMP_EFFORT_STBD>
          <PORT_VELOCITY>22.1</PORT_VELOCITY>
           <PORT_DENSITY>1.02</PORT_DENSITY>
         <STBD_VELOCITY>23.3</STBD_VELOCITY>
          <STBD_DENSITY>1.03</STBD_DENSITY>
         <WATER_DEPTH/>
          <PORT_DRAG_X coord_type =  "LL">10.123351</PORT_DRAG_X >
          <PORT_DRAG_Y coord_type =  "LL">-80.123337</PORT_DRAG_Y >
          <STBD_DRAG_X coord_type =  "LL">10.123347</STBD_DRAG_X >
          <STBD_DRAG_Y coord_type =  "LL">-80.123339</STBD_DRAG_Y >
    </HOPPER_DATA_RECORD>
</HOPPER_DREDGING_DATA>
<cr>
<lf>
```

3.4.5 Legacy Data Reporting Format

For compatibility, the previous version (Legacy) of the hopper dredge data transfer standard is included. Existing implementations of this standard may be used if the contracting officer requires only the reporting of parameters that are part of legacy reporting. Reporting parameters not contained in the legacy format (such as empty

displacement or drag head position) shall be reported via XML tags as described in 3.4.1. This legacy standard may be depreciated at a future date so all new implementations shall use the XML tags (3.4.1).

Sensor Data (Parameter)	Units	Data Format	Character Length	Character Position
Version	V1.11	ASCII string	5	1 - 5
Date	yymmdd (local)	ASCII string	6	6-11
Time	hhmmss (local)	ASCII string	6	12-17
Position Error	feet	Floating point	4	18-21
X location	feet	Floating point	7	22-28
Y location	feet	Floating point	7	29-35
Forward draft	feet	Floating point	6	36-41
Aft draft	feet	Floating point	6	42-47
Tide elevation	feet	Floating point	5	48-52
Port dragarm velocity	feet/sec	Floating point	4	53-56
Port dragarm density	grams/liter	Floating point	4	57-60
Starboard dragarm velocity	feet/sec	Floating point	4	61-64
Starboard dragarm density	grams/liter	Floating point	4	65-68
Port gimbal depth	feet	Floating point	4	69-72
Starboard gimbal depth	feet	Floating point	4	73-76
Port draghead depth	feet	Floating point	4	77-80
Starboard draghead depth	feet	Floating point	4	81-84
Heading	degrees true	Integer	3	85-87
Course	degrees true	Integer	3	88-90
Water depth (below hull)	feet	Floating point	4	91-94
Speed (over ground)	knots	Floating point	4	95-98
Hopper volume	cubic yards	Floating point	6	99-104
Current ship weight	long tons	Floating point	6	105-110
Forward ullage	feet	Floating point	4	111-114
Aft ullage	feet	Floating point	4	115-118
Stb. minimum pumping effort	T/F	ASCII	1	119
Port minimum pumping effort	T/F	ASCII	1	120
Starboard pumping water	T/F	ASCII	1	121
Port pumping water	T/F	ASCII	1	122
Port material recovery	T/F	ASCII	1	123
Starboard material recovery	T/F	ASCII	1	124
Hopper open	T/F	ASCII	1	125
Pumpout Active	T/F	ASCII	1	126
Load Number	loads	Integer	4	127-130
<Carriage Return>	n/a	ASCII	1	131
<Line Feed>	n/a	ASCII	1	132

Example data string:
V1.11991208015929 1.1798859 96072 6.8 8.3 1.4 .0 .00<line break>
.01.02 .0 3.3 .0 4.9 7 8 7.610.0 747. 521. 3.8 4.6FFFFFFFF0111<cr><lf>

3.4.6 Legacy Format Data Reporting Metadata

Any data that are out of range, missing, or considered unusable for any other reason shall be reported as the value 999. If a true/false value cannot be computed, then it should be reported as the letter U for unknown. Each data string is followed by a carriage return - line feed combination. The definitions of the data parameters follow:

Version Version of string - This version is designated V1.11

Date Date in local time of the sensor measurements, formatted yymmdd.

Time Local time of the measurements formatted hhmmss.

Position Error
For conventional positioning systems this is the RMS error of ship's position based on the X and Y range values used to calculate the position. For a GPS-based system, this is the Horizontal Dilution of Precision (HDOP) value.

X location X (easting) position of the dredge.

Y location Y (northing) position of the dredge.

Forward and aft draft
Draft of vessel below waterline at the forward and aft sensor locations.

Tide elevation Tide height relative to district standard datums.

Port & Stbd dragarm velocity Velocity of water moving through the dragarms.

Port & Stbd dragarm density
Specific gravity of water/material mixture in the dragarms. Valid values are 1.0 to 2.0; values < 1.0 indicate no water in the dragarm.

Port & Stbd. gimbal depth Depth below water surface of the dragarm gimbals. *Optional***.**

Port & Stbd. draghead depth
Depth below water surface of the low fixed point of each draghead. This value includes a correction for the draft and trim of the vessel, and is not depth below the keel.

Heading Heading in degrees of the vessel. Values are from 000 to 359.

Course
Vessel course in degrees made good as computed from the vessel's navigation system data over 10 second intervals. Values are from 000 to 359.

Water depth Depth below the keel at the location of the sensor. *Optional.*

Speed Vessel speed over the ground averaged over the reporting interval.

Current ship weight Weight of the vessel at the time of measurement.

Ullage (fore, aft)
Distance from the top of the hopper down to the surface of the dredged material in the hopper. This distance is called ullage and the corresponding capacity tables are known as hopper ullage tables. These values are obtained either by averaging multiple sensors (i.e., from port and starboard corners of the fore hopper for one value and, from port and starboard corners of the aft hopper for another) or optimal placement of a single fore and single aft sensor.

Hull - Split or closed
If the hull is split, then the value is true. If the hull is closed, then the value is false.

Hopper doors - open or closed
Status of the hopper doors as either open (true), all doors fully closed (false), or undetermined (unknown). Any single hopper door open requires a door open status.

Pumpout
Status of pumpout activity. When pumpout is active the value is true, when pumpout is not active the value is false.

Material Recovery
True when the hopper dredge is digging material. For example when the slurry velocity is greater than 10 feet per second and the density is greater than 1.05 grams per cubic centimeter, then material recovery is True. These criteria may be tailored for each dredge and project. This value is applied to each dragarm.

Pumping Water
True when the hopper dredge is not recovering material but only pumping water. For example when the slurry density is less than 1.05 grams per cubic centimeter, then the dredge is pumping water. This criterion may be tailored for each dredge and project. Other parameters such as pump vacuum (for example) could be used to satisfy the pumping water requirement.

Minimum Pumping Effort
True when the hopper dredge's dredge pumps are either idling to assure minimum dragarm intake velocity or off. Pump revolutions per minute below a certain idle threshold or dragarm slurry velocity at or below the idle speed threshold could be used depending on the particular dredge plant and project. The minimum pumping effort value is reported for each dragarm. The criteria may be tailored for each dredge and project.

Load Number
The number of the load that the dredge is currently working on. Typically the load number is incremented at the completion of the disposal phase of each loading cycle. Loads are determined according to the convention specified by the CONTRACTING OFFICER or his/her representative.

3.4.7 Contractor Data Backup

The dredging contractor shall maintain an archive of the data sent to the CONTRACTING OFFICER or his/her representative's computer for the length of the dredging project. The CONTRACTING OFFICER or his/her representative may request (at no additional cost to the contract price) that the contractor provide a copy of these data covering specified time periods. The data shall be provided on PC format CD-ROM (or other storage medium acceptable to the CONTRACTING OFFICER or his/her representative) and each of the requested time periods shall be identified.

3.5 DREDGE PLANT INSTRUMENTATION PLAN

The contractor shall submit a Dredge Plant Instrumentation Plan prior to

commencement of dredging operations. Refer to section 3.8 for the schedule of submittal. The plan shall include at a minimum:

3.5.1 Dredge Computations and Documentation

All computations for a particular dredge concerning deriving computed data elements as required in section 3.4.3 from sensor data elements shall be provided to the CONTRACTING OFFICER or his/her representative. Any changes to the computing methods during the dredging contract must be approved in writing by the CONTRACTING OFFICER or his/her representative prior to the change being applied. These computations include the vessel displacement, hopper volume, material recovery, pumping water, and the minimum pumping effort.

The contractor shall provide the dragpipe length dimensions and offset distances from the DGPS antenna location to the centerline of each draghead. The inside pipe diameter along with the location of the slurry density and slurry velocity metering system sensors shall also be provided to the CONTRACTING OFFICER or his/her representative. All dimensions and drawings are to be certified by a licensed marine surveyor or architect.

The contractor shall also provide the CONTRACTING OFFICER or his/her representative with dimensioned-drawings of the hopper with hopper level sensor locations included. These drawings should include hopper length, depth, and width with hopper level sensors referenced to the overall dimensions. A typical mid-ship hopper cross-section should be included with dimensions. The overall dredge dimensions shall also be provided, indicating the locations of the fore and aft draft sensors with regard to; 1) horizontal and vertical distances from the keel, 2) horizontal and vertical distances between each draft sensor, 3) vertical distances to the hopper level sensors, 4) distance of aft draft sensor to aft perpendicular, 5) distance of fore draft sensor to fore perpendicular, 6) distance of the aft draft sensor from the midship section, and 7) distance of the fore draft sensor from the midship section. The contractor shall also provide in writing as part of the DPIP; how to relate fore and aft ullage sensor measurements to hopper volume calculations.

3.5.2 Data Reporting

Non-standard sensor data names not in section 3.4.3 shall be supplied to the CONTRACTING OFFICER or his/her representative. An example ASCII format file of data to be exported to the CONTRACTING OFFICER or his/her representative's computer shall be provided with the DPIP.

3.5.3 Computer Hardware

The brand name and specifications of furnished computer hardware.

3.5.4 Calibrations

The contractor shall provide certificates of calibration and/or manufacturer certificates of compliance for all needed dredge information. These include slurry density, slurry velocity, heading, draft, hopper level, water depth, and draghead depth.

3.5.5 Instrumentation Quality Control Methods

Test methods used by the contractor to provide quality control of input sensor data should be documented. These test methods shall include the checking of sensors to verify that reported values are applicable for that sensor and the particular project being dredged

3.5.6 Sensor Log

The contractor shall maintain a log of sensor performance and modifications during the length of the dredging contract. The log shall contain the time when a sensor fails (and subsequently repaired). The log shall also include the time and results of sensor calibrations, the time of sensor replacements, and the time when backup sensor systems are initiated to provide required data. It shall also contain the name of the person responsible for the sensor work. Only sensors that affect the data reported in section 3.4.3 are affected by this logging requirement.

3.5.7 Hopper Volume and Dredge Displacement

In the DPIP, the contractor shall supply the CONTRACTING OFFICER or his/her representative with the dredge ullage table which lists the hopper volume as a function of hopper level, a dredge draft displacement table listing the dredge displacement as a function of draft, and the vessel's hydrostatic curves and lines drawing. A licensed marine surveyor or architect who is independent of the contractor must certify these tables, curves, and lines drawing. The contractor should specify the most accurate method for calculating hopper volume based on fore and aft hopper level and displacement based on fore and aft draft.

3.5.8 Summary of DPIP Deliverables

Description	Referring Section
Hopper volume computation, hopper ullage table	3.5.1, 3.5.7
Dredge displacement computation	3.5.1, 3.5.7
Dredge dimensions - dragpipe lengths, offset distance from DGPS antenna, draft sensor/hull draft markings relation, draft and hopper sensor offsets	3.5.1, 3.1.6, 3.6.2
Hopper dimensioned drawing	3.5.1
Hopper cross-section drawing	3.5.1
Overall dredge dimensioned drawing	3.5.1
Vessel's hydrostatic curves and lines drawing	3.5.1
Quality control methods	3.5.5
Computer system hardware documentation	3.5.3, 3.3.1, 3.3.2, 3.3.3, 3.3.4
Proposed revisions to data reporting interface	3.5.2, 3.4.1, 3.4.2
Sensor calibrations - draft, slurry density, slurry velocity, hopper level, water depth, and draghead depth	3.5.4, 3.1.1, 3.1.2, 3.1.3, 3.1.6, 3.1.7, 3.1.10
Sensor Log	3.5.6, 3.4.1, 3.4.2

3.6 QUALITY ASSURANCE TESTS

3.6.1 Water Test

Each water test shall consist of pumping the hopper out to its lowest level and then filling the hopper to capacity with water. The objective of the water test is to assure data consistency by comparing the system-measured water specific gravity to that of the value determined by analyzing water samples retrieved from the hopper. The CONTRACTING OFFICER or his/her representative will direct the contractor in performing up to three water tests at no additional cost to the contract price. After the first water test, the CONTRACTING OFFICER or his/her representative will evaluate the data for accuracy. If the CONTRACTING OFFICER or his/her representative's review of the data indicates an unsatisfactory calibration, a re-calibration of the sensors and review of contractor-supplied displacement and hopper volume may be necessary before completing additional water tests. During dredging operations, up to two additional water tests may be conducted per

week at the time and discretion of the CONTRACTING OFFICER or his/her representative. The CONTRACTING OFFICER or his/her representative will review the water test data to insure that the system is operating within acceptable accuracy, directing the contractor to re-calibrate or repair system components as necessary.

The Contractor shall provide a handheld refractometer with automatic temperature compensation to measure the hopper water specific gravity during water tests. The refractometer shall be capable of measuring the hopper water's specific gravity with a resolution of 0.001 and minimum accuracy of $\pm$ 0.001. The Contractor shall also provide a water-sampling device to retrieve a sufficient volume of water from various depths in the hopper to accurately determine specific gravity with the refractometer.

3.6.2 Relative water level tests

The relative water level test consists of opening the bottom dump doors (or corresponding equipment) to allow the water level surrounding the dredge to equalize with the water level in the hopper and comparing the draft and ullage sensor-measured values of the same water plane. During dredging operations, up to two additional relative water level tests may be conducted per week at the time and discretion of the CONTRACTING OFFICER or his/her representative. The CONTRACTING OFFICER or his/her representative will review the test data to insure that the system is operating within acceptable accuracy, directing the contractor to re-calibrate or repair system components as necessary. The contractor shall provide to the CONTRACTING OFFICER or his/her representative sufficient dredge configuration data including the vertical distance between hopper level sensors and draft sensors.

3.6.3 Hopper level

The CONTRACTING OFFICER or his/her representative will periodically check the reported hopper level. Tape measure or other distance measuring means shall be used. The Contractor shall have on the dredge a clearly readable weighted tape with measurements shown in foot-and-tenths-and hundredths, capable of measuring the full hopper depth. The weight for this tape shall be a 6-inch diameter disk weighing between 2 and 3 pounds. The CONTRACTING OFFICER or his/her representative will review the hopper level data to insure that the system is operating within acceptable accuracy (1/10 foot), directing the contractor to re-calibrate or repair system components as necessary.

3.6.4 Draghead Depth

The CONTRACTING OFFICER or his/her representative may require periodic calibration checks of the reported draghead depth over a calibration point at the project site. The CONTRACTING OFFICER or his/her representative may also use direct means such as tape measures, sounding lines, and pressure sensors to directly measure draghead depth. The Contractor shall have on the dredge a clearly readable steel tape, chain, or wire graduated in 1 and 1/2 foot increments. This tape or chain shall be capable of measuring the depth below water surface of the low fixed point of each draghead with sufficient length to measure 5 feet over the maximum project depth. . The CONTRACTING OFFICER or his/her representative will review the hopper level data to insure that the system is operating within acceptable accuracy, directing the contractor to re-calibrate or repair system components as necessary.

3.7 LIST OF ITEMS PROVIDED BY THE CONTRACTOR

Description	Section Reference
Computer system, UPS, and printer	3.3.1, 3.3.3, 3.3.4
Network hub	3.3.2
Dredge Plant Instrumentation Plan	1.3, 3.1, 3.5, 3.5.3, 3.5.4, 3.5.5, 3.5.6
Dredge hopper level and volume	3.1.7, 3.5.7, 3.6.3, 3.6.1, 3.6.2, 3.6.3
Dredge draft and displacement	3.5.1, 3.1.6, 3.2, 3.5.7, 3.6.1, 3.6.2
Data reporting interface	3.4, 3.4.1, 3.4.2, 3.4.3, 3.2, 3.3.1
Dredge heading	3.1.5, 3.2, 3.4.1, 3.4.2
Draghead depths	3.1.3, 3.6.4, 3.2
Report tide level	3.1.8, 3.4.3, 3.2
Hopper status	3.1.9, 3.4.2, 3.4.3, 3.2
Dredge material recovery status	3.1.10, 3.4.2, 3.4.3, 3.2
Dredge Data Acquisition Time	3.1.11, 3.4, 3.4.2, 3.4.3, 3.2
Slurry density	3.5.4, 3.4.2, 3.4.3, 3.2
Slurry velocity	3.5.4, 3.4.2, 3.4.3, 3.2
Pumpout status	3.1.12, 3.4.2, 3.4.3, 3.2
Dredge pumping water status	3.1.13, 3.4.2, 3.4.3, 3.2
Dredge minimum pumping effort status	3.1.14, 3.4.2, 3.4.3, 3.2
Dredge position	3.4.2, 3.4.3, 3.1.4, 3.2
Refractometer	3.6.1
Water Sampling Device	3.6.1
Hopper level measurement tape	3.6.3
Draghead depth measurement tape	3.6.4

3.8 SCHEDULE OF DPIP SUBMITTAL

The Contractor DPIP submittal shall be required prior to the Preconstruction Conference. Prior to dredging operations or within 48hours after dredging operations have begun, the onboard system will be required to be inspected and approved by the CONTRACTING OFFICER or his/her representative.

The Contractor shall be allowed up to 72 hours after dredging has commenced to have a fully operational SI system in accordance with this attachment – HOPPER DREDGE SILENT INSPECTOR or the Contractor shall be subject to paragraph PERFORMANCE REQUIREMENTS and possible suspension of dredging operations until the SI System becomes fully operational in accordance with this attachment.